

REMARKS/ARGUMENTS

The final Office Action mailed December 17, 2007 has been carefully considered. Claims 1-5, 7-14 and 17-20 are pending in the present application with claims 1, 10 and 19 being in independent form. Claims 6, 15 and 16 were previously canceled without prejudice or disclaimer. A copy of the claims indicating the present status of each is included herewith for the convenience of the Examiner.

Claims 1-5, 7-14 and 17-20 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,952,815 to Rouillard et al. (hereinafter "Rouillard"). Reconsideration of this rejection is respectfully requested.

The Examiner argues that Rouillard discloses substantially all of the features of claim 1, for example, of the present application. Applicants respectfully disagree.

Claim 1 requires electrical storage modules connected in series between a first terminal and a second terminal, a DC-to-DC converter coupled to the electric charge source and to each of the electrical storage modules, the DC-to-DC converter being operable to receive incoming power from the electric charge source and to supply a respective voltage fraction of the DC-system voltage to each electrical storage module and controlling the voltage fraction provided to each module to vary over time within a voltage interval around a respective nominal module voltage of each module, such that the voltage fraction supplied to each module is higher than the respective nominal module voltage of each module.

Rouillard discloses an apparatus and method for regulating charge voltage in a number of electrochemical cells connected in series. In particular, Rouillard discloses the use of equalizer modules 302 associated with each cell 304 to provide for a bypass of the charging current I_C around the individual cell when desired in order to control charging of the cell.

Rouillard, however, does not disclose "a DC-to-DC converter coupled to the electric charge source and to each of the electrical storage modules, the DC-to-DC converter being operable to receive incoming power from the electric charge source and to supply a respective voltage fraction of the DC-system voltage to each electrical

storage module wherein the DC-to-DC converter is further operable to control the respective voltage fraction to vary the respective voltage fraction over a time period within a voltage interval around the respective nominal module voltage of each electrical storage module such that during the time period the respective voltage fraction supplied to each electrical storage module is set to be higher than the respective nominal module voltage of each electrical storage module,” as is required by claim 1, for example.

As an initial matter, it does not appear that Rouillard specifically discloses a DC-to-DC converter at all. The Examiner merely asserts that a DC-to-DC converter is disclosed in Fig. 31 of Rouillard, however, fails to identify any specific element that corresponds thereto. The Examiner contends that the charger 322 corresponds to the electric charge source of claim 1, and thus, it is not the DC-to-DC converter. The equalizer modules 302 are also not DC-to-DC converters since they do not appear to convert voltage, but merely monitor voltage across the individual cells and activate the bypass circuit 346 when appropriate to allow the charging circuit to bypass the cell.

Further, it follows that Rouillard also fails to disclose a DC-to-DC converter that is “coupled to the electric charge source” or that it is connected “to each of the electrical storage modules.” As can be seen in Fig. 31 of Rouillard, the charger 322 is connected only to the cells C1 and CN and is not connected to a DC-to-DC converter. Further, none of the equalizer modules 302 are connected to each of the cells C1, C2, and CN. Thus, even if one were to presume that the equalizer modules were DC-to-DC-converters, which they are not, Rouillard still fails to disclose this feature.

In addition, there is no disclosure in Rouillard of a DC-to-DC converter “operable to control the respective voltage fraction to vary the respective voltage fraction over a time period within a voltage interval around the respective nominal module voltage of each electrical storage module such that during the time period the respective voltage fraction supplied to each electrical storage module is set to be higher than the respective nominal module voltage of each electrical storage module.” As is noted above, there does not appear to be a DC-to-DC converter at all in

Rouillard. Further, there is no disclosure anywhere in Rouillard of any element is “operable to control the respective voltage fraction to vary the respective voltage fraction over a time period...” as is further required by claim 1.

As is noted above, Rouillard does not disclose a DC-to-DC- converter at all, much less one that supplies a respective voltage fraction of the DC-system voltage to each electrical storage module and that is operable to control the respective voltage fraction to vary the respective voltage fraction over a time period. Further, in Rouillard, the modules 302 are used to control a charging current based purely on the voltage of the cells, there is no consideration of a time period at all.

Accordingly, it is respectfully submitted that claim 1, and the claims depending therefrom, are patentable over the cited art for at least the reasons described above.

Claim 10 similarly relates to a method of charging a plurality of electrical storage modules including DC-to-DC converting the DC-system voltage into a respective voltage fraction per electrical storage module, supplying the respective voltage fraction to each electrical storage module and controlling the respective voltage fraction to vary over a time period within a voltage interval (V_D) around a respective nominal module voltage of each electrical storage module such that the respective voltage fraction supplied to each electrical storage module within the time period is set to be higher than the respective nominal module voltage of each electrical storage module. As is noted above, Rouillard does not disclose the Dc-to-DC conversion of the present application and also does not disclose varying the voltage fraction over a period of time.

Accordingly, it is respectfully submitted that claim 10, and the claims depending therefrom, are patentable over the cited art for at least the reasons described above.

Similarly, claim 19 recites an electrical energy storage system including “a DC-to-DC converter coupled to the electric charge source and to each of the electrical storage modules, the DC-to-DC converter being operable to: receive incoming power from the electric charge source; to supply a respective voltage fraction of the

DC-system voltage to each electrical storage module” and “to vary each respective voltage fraction over a period of time within a voltage interval around the respective nominal module voltage of each electrical storage module such that within the period of time the respective voltage fraction supplied to each electrical storage module is set to be higher than the respective nominal module voltage of each electrical storage module.” As is noted above, Rouillard does not disclose these features.

Claim 19 further requires that the DC-to-DC converter be operable “to control the respective voltage fraction over the electrical storage modules such that an average time interval during which the respective voltage fraction exceeds the respective nominal module voltage is substantially equal for all the electrical storage modules; and to control the respective voltage fraction over the electrical storage modules such that an average voltage fraction of the DC-system voltage being supplied to each electrical storage module is substantially equal in magnitude for all the electrical storage modules.” Rouillard also fails to disclose a DC-to-DC converter including these features.

Accordingly, it is respectfully submitted that claim 19 is also patentable over the cited art for at least the reasons described above.

Claims 2 and 11 remain rejected under 35 U.S.C. § 103 as being obvious from Rouillard. Reconsideration of this rejection is respectfully requested.


As discussed, Rouillard does not disclose or suggest the recitations of claims 1 and 10, and claims 1 and 10 would not have been obvious from Rouillard. Therefore, since claims 2 and 11 depend from claims 1 and 10, respectively, claims 2 and 11 are patentably distinguishable over Rouillard for at least the same reasons.

In light of the remarks made herein, it is respectfully submitted that claims 1-5, 7-14 and 17-20 are patentable over the cited art and are in condition for allowance.

Favorable reconsideration of the present application is respectfully requested.

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Respectfully submitted,



Keith J. Barkaus

Registration No.: 51,431

OSTROLENK, FABER, GERB & SOFFEN, LLP

1180 Avenue of the Americas

New York, New York 10036-8403

Telephone: (212) 382-0700

RCF/KJB